

WU 500 B286e 1922

51120770R



NLM 05266616 8

NATIONAL LIBRARY OF MEDICINE

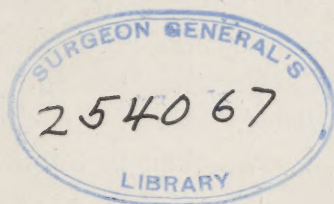




Berthold, Arthur H. R

Engineering Applied to Dentistry

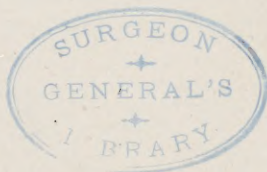
*A discussion of modern ideas
and old principles which are
based on many years of re-
search work, study and prac-
tical experience.*



Presented to the Dental Profession

by

**The International Dental Manufacturing Co.
CHICAGO**



Copyright 1922

WU

500

B286e

1922

PROGRESS results from dissatisfaction with things as they are and the desire to make them better. PROGRESS demands courage and is only achieved through effort and sacrifice. PROGRESS is to do a thing first and better—to keep ahead of custom and tradition; to accept the burden of leadership and to suffer the jibes and jeers of the self-satisfied, who find it far easier to scoff and scorn than to think and do.

JOHN J. McGRATH.

MAR -6 1922 ✓R

©C1A752914C

no 2

ENGINEERING APPLIED TO REMOVABLE DENTURES

ARTIFICIAL Dentures are held in place by friction where atmospheric pressure is not the main sustaining force.

Powers which work against a Removable Denture

This friction is increased by clasps or attachments.

Clasps transfer direct friction against the enamel of the tooth and this is, in some cases, harmful.

Attachments give a direct friction against some gold part only and this is their advantage.

Both attachments and clasps are injurious to teeth and surrounding tissues when they allow leverage to be transmitted to the abutment, under mastication.

Practical experience has demonstrated this and the following physical formulas will prove it.

The powers which work against the abutment, attachment and the artificial restoration may be classified into

- 1) Straight Vertical power
- 2) Diagonal power
- 3) Lever power

1) Under straight vertical power we understand the energies which concentrate in a vertical direction against the center axis of a tooth.

2) The diagonal power concentrates against some part on the periphery of a tooth and thus transfers stress sideways or in a diagonal direction against the center axis of the tooth.

3) Lever power transmits pressure against a tooth and is produced by attaching dentures ridgedly to an abutment.

In restoring lost masticatory organs we must base their artificial construction upon the natural and resistance qualities of the tissues so they may not be injured by these devices. We must also respect the physical laws or laws of nature which guide similar constructions in engineering.

We know that every tooth is maintained in its socket and supported against the stress under mastication principally by the horizontal, oblique and apical fibers of the periodontal membrane.

The resistance force of Special Tissues

The arrangement of these fibers is such that their greatest resistance is placed against the depression of a tooth (vertical power) while a lateral movement (diagonal and lever powers) or tipping is more easily obtained.

The thickness of the periodontal membrane depends on the age of the patient, being much greater in young persons and becoming gradually less with age.

The resistance force of a tooth depends on the elasticity of the peridental membrane and the condition of the pulp.

Therefore to establish some physical formulas which will show the leverage on teeth under certain conditions, the age of the patient and the physical condition of the pulp will be the guiding factors.

Hook's law of elasticity says: "When a body is strained beyond a certain amount and then released, it fails to return completely to its original form and volume or it retains a permanent set. The largest strain of any kind which a body may undergo and still completely recover from when released is called *the limit of elasticity* for that form of strain and the corresponding stress is called *the limit of stress*."

Dr. G. V. Black demonstrated with his "Gnathodynamometer" the limit of elasticity of the peridental membrane. He showed that the average limit of elasticity of the peridental membrane is 171 pounds on the molar teeth and considerable less on bicuspid and incisors.

We all know that overstress will cause a pathological condition and, exerted against a tooth it will cause either the death of the pulp, the absorption of the root or the destruction of bone cells and

it may enforce the fracture of the enamel, the fracture of the tooth or of the bone.

We must also take into consideration that any removable denture resting upon the tissues does not have its seat on a solid stone-like mass but upon an elastic gum tissue which allows an average condensation of 1 mm.

Modern Dentistry is so far advanced that we only extract teeth which become harmful to the surrounding tissue or the system by abscesses, phorrhea alveolaris or other diseases.

These conditions may be the cause of constant tissue changes and the resulting misfit of the denture after a certain period of time.

The most important physical law in attachment work is the law of levers.

We know through orthodontia experience that in young persons the tipping of a tooth is easily performed because the thickness and elasticity of the periodontal membrane places the fulcrum near the apex of the root, while this or any other tooth movement in older persons is more difficult because the periodontal membrane is thinner, less elastic and therefore the fulcrum lies near the gingival line.

This may be demonstrated by driving a nail $1\frac{1}{2}$ its length into a block of soft

rubber and one into a block of wood and then applying force to the top of the nails.

This fact forces us to establish distinct different lever formulas for young and old persons as the following diagram will show.

A lever is a bar supported at a point called the Fulcrum F (see sketch and formulas on page 7). A force P applied to the bar at a certain point a will overcome a resistance force Q acting at another point b . We shall suppose that P and Q act at right angles to the bar and to the axis of rotation at the fulcrum.

*Physical
Laws
to be
observed*

The work done by the applied force P is measured by the product of P and the distance a F through which P acts. The work done against the resistance is measured by the product of the resistance force Q and the distance b F through which it is overcome.

This valuable information we have employed for the construction of a general attachment lever formula, claiming again the following facts:

*Physical
Laws
Applied
to the Con-
struction
of Re-
movable
Dentures*

- a) The limit of resistance of the periodental membrane with a healthy pulp in the tooth is 171 pounds.

- b) The limit of resistance of the peridental membrane with a dead or removed pulp in the tooth is 80 pounds.
- c) The force required in mastication is 90 pounds.
- d) As the gum tissues give under stress a settling of the denture will take place or the abutment will receive all the stress.
- e) The stress in mastication comes from a vertical and a diagonal direction.

STANDARD LEVER FORMULA

P = the amount of Force (pounds)
acting against a lever

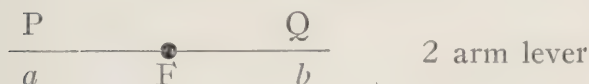
F = the Fulcrum

Q = the Resistance force

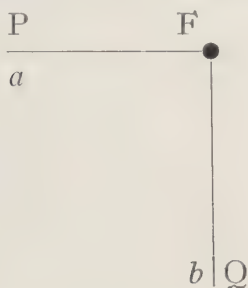
a F = the length of the P arm

b F = the length of the Q arm

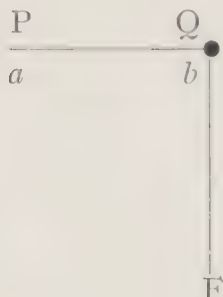
$$P \times a F = Q \times b F$$



Applied to old persons with the Fulcrum near the gingival line, is a 2 arm lever the horizontal line representing the denture and the vertical line the tooth.



Applied to young persons with the Fulcrum near the apex, is a one arm lever the horizontal line representing the denture and the vertical line the tooth.



The horizontal line is the length of saddle = 4 cm.

F b length of tooth = 2 cm.

Q = 171 pounds with live pulp

Q = 80 pounds with dead pulp

P = 90 pounds masticating force.

Therefore leverage against abutment may be figured as follows:

Old Persons

Live Pulp	Dead Pulp
$90 \times 4 = 171 \times 2$	$90 \times 4 = 80 \times 2$
$360 = 342$	$360 = 160$
Overpressure = 18 pounds	Overpressure = 200 pounds

Above problem proves that lever does not balance and that we have overpressure.

Young Persons

Live Pulp	Dead Pulp
$90 \times 4 + 2 = 171 \times 2$	$90 \times 4 + 2 = 80 \times 2$
$540 = 342$	$540 = 160$
Overpressure = 198 pounds	Overpressure = 380 pounds

Above problem proves that lever does not balance and that we have overpressure.

These formulas prove that in constructing an attachment case we must be very careful not to destroy when we aim to rebuild, especially so since the above proven overpressure is figured on only one (vertical) power and does not include diagonal pressure and the constant maintenance of these powers.

*The proof
obtained
by physical
formulas*

Even a 5 pound force which is constantly applied against some tooth will produce tissue changes more or less harmful in proportion to its duration and direction.

With the formulas given herein the leverage may be figured for any fixed or removable bridge with one or more abutments.

CHAPTER II.

THE BERTHOLD ATTACHMENT

Keeping in mind the powers that work against the abutment and heretofore described as

- 1) Straight Vertical Power
- 2) Diagonal Power
- 3) Lever Power

and that the ideal attachment must be so constructed as to break or prevent the transmission of these powers to the abutment, The Berthold Attachment was devised and perfected and is now presented to the Dental Profession.

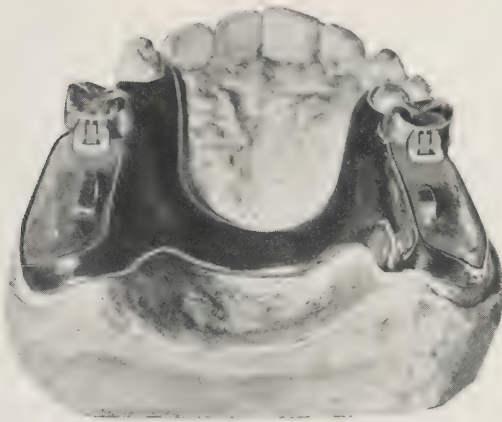
It will give like a hinge *only* in the direction of the force and act as a *shock absorber*.

Its movability under masticating force eliminates all abutment strain and it acts as a *stress breaker*.

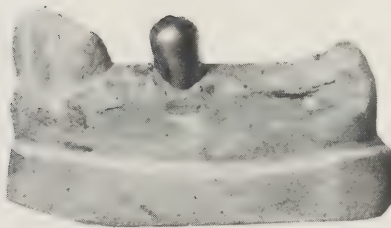
The denture, regardless of its length, cannot act as a lever against the abutment where The Berthold Attachment is used.

The construction of this attachment is based upon sound engineering principles and is mechanically and scientifically perfect.

It is simple for the dentist and patient to manipulate, therefore superior to any other attachment on the market.



THE BERTHOLD ATTACHMENT
IS INDICATED in Palatine and Lingual
Bar, Buccal Restoration, Cast Clasp and
all Removable Bridge Cases where Lever-
age of any kind must be Eliminated.





Note this typical Buccal Restoration. It is held firmly against the tissue when in normal position. Its action is *downward* in the direction of masticating force, to the amount of tissue condensation.

The construction of The Berthold Attachment *prevents upward* movement. No leverage is transmitted to the abutment. The denture rides like a door on a hinge.

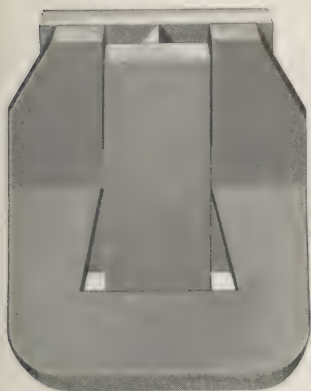


Fig. No. 1

Fig No. 1 shows the complete and assembled Berthold Attachment consisting of two parts, A and B in *normal position*.



Fig. No. 2

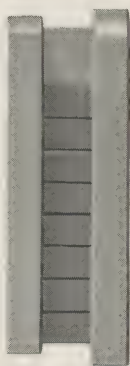


Fig. No. 2 shows front and side view of Part A. This part is like a section of railroad track with friction undercuts along the "neck"

and with a tapered top edge.



Fig. No. 3

Fig. No. 3 shows Part B which is made of the highest grade clasp casting metal. It is a spring and clasps the "neck" of part A.

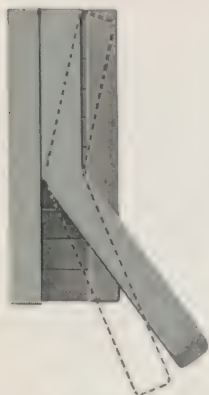


Fig. No. 4

Fig. No. 4 shows the movability of The Berthold Attachment downward under masticating force when the attachment is in *normal position*.



Fig. No. 5

Fig. No. 5 shows the movability of The Berthold Attachment downward under masticating force when the denture has settled below *normal position*.

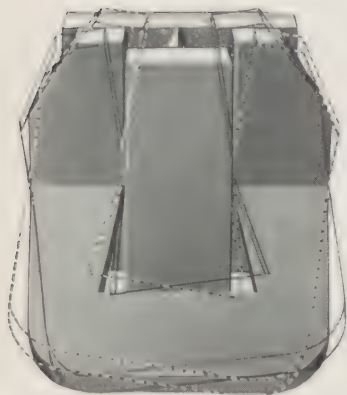


Fig. No. 6

Fig. No. 6 shows the free lateral movement of The Berthold Attachment when either in normal or settled position.

VULCANITE DENTURES



Fig. No. 7

In using The Berthold Attachment with Vulcanite Dentures solder a wire to spring Part B, and be sure that the free end of this wire lies firmly against plaster model when the assembled attachment is in *Normal Position*. See Fig. No. 1 and Fig. No. 7.

This will prevent spring, Part B, tipping forward when packing or pressing flask.

Before waxing up case, cover crown and upper part of attachment with cement to prevent rubber adhering to crown or upright arms of spring, Part B, in vulcanizing. (See Fig. No. 8 where a thin sheet of pure gold is used for a similar purpose.)

GOLD DENTURES



Fig. No. 8

When soldering spring, Part B, to a removable gold bridge cut a piece of 36 gauge pure gold like pattern shown in Fig. 8 and burnish it snugly against crown and the upper part of the assembled attachment.

Be sure that the attachment is in *Normal Position* as shown in Figs. No. 1 and 8.

After case is removed from model and ready to invest, first paint with anti flux the two exposed upright arms of spring, Part B, and then cover well with investment.

CAST CLASPS



Fig. No. 9

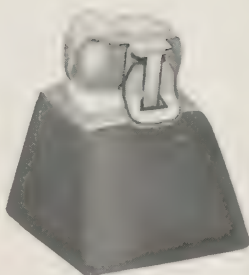


Fig. No. 10

To use The Berthold Attachment as a *stress breaker* or *shock absorber* in connection with cast clasps, solder a piece of 32 gauge clasp metal or 22k gold on top and bottom of the *assembled attachment* as shown in Fig. No. 9. Note must be soldered only to Part A.

Then solder the attachment to clasp as shown in Fig. No. 10.

When clasp is used in gold or vulvanite cases follow technic as described above under these respective headings.

The object of the stops on top and bottom of attachment Part A is to keep the clasp permanently attached to denture.

Some dentists prefer to leave off the above described stops on Part A of the Attachment for the reason that there is a distinct advantage in leaving the clasp on the tooth when the patient removes the denture.

IMPORTANT POINTS TO BE OBSERVED

All attachments are made of clasp metal which should not be overheated. Cherry red heat is the most any clasp metal will stand and still retain its elasticity.

Do not solder attachment parts over open flame, always invest.

The Berthold Attachment is made in one size, large enough for the heaviest cases. Where bite is close at least one-third of the upper ends of Parts A and B may be ground off without impairing the proper function of the attachment.

A HOMELY COMPARISON

BUT TO THE POINT

Sound mechanics will tell you to use a hinge and not nails or spikes when you hang a door to its frame.

The hinge removes the leverage.

The Berthold Attachment in dentistry represents the hinge.

IN CONCLUSION

The Berthold Attachment is the solution of and answer to any and all trouble and annoyance that you may heretofore have experienced with removable dentures retained by other types of dental attachments.

CHAPTER III.

VALVES IN ARTIFICIAL DENTURES

THE Berthold Valve has been called *Intro-*
the heart of an artificial denture, *duction*
and the simile is not badly chosen;
for this valve is a distinct and vital part
of a modern dental plate controlling and
regulating the circulation of its life fluid
in a manner not entirely unlike that of a
living heart.

It is the office of the Berthold Valve to
direct the motion and action of the saliva,
air and atmospheric pressure to best ad-
vantage and without injury, so as to make
the artificial denture an effective and
economical appliance.

As the valve has been designed so as
to effect an even vacuum distribution
under the plate, it has attained a peculiar
significance in scientific plate construc-
tion.

In recognition of this fact an attempt
has been made in this thesis to treat the
subject with due regard to the various
requirements of modern practice.

The fundamental principles are fully
explained. An endeavor has been made
to present the subject matter in a con-
densed form, as being best adapted to the
requirements of practical men, and the
author has in this respect followed the

suggestions of his extensive personal experience in dental valve construction of various types.

Starting with the fact that an artificial denture is held in place by some *force* and that the denture has been constructed for the purpose of doing some *work*, the following fundamental laws of physics must be understood by the student who attempts to go into the deep study of scientific plate construction.

*Physical
Laws that
Govern the
Retention
of
Artificial
Dentures*

In mechanics the term *load* means the combination of external forces acting on any piece of construction.

The *load* on a denture would be the weight of the plate, friction and leverage while food is being masticated and the pressure of the tongue and muscles against the artificial teeth.

The average plate weighs.....15 dwt.

The average force required for mastication is.....90 lbs.

The force the tongue may produce is.....1½ lbs.

This shows that we must employ over 100 pounds of retaining force or energy to resist this *load*. This we accomplish by using

- 1) Atmospheric Pressure
- 2) Adhesion
- 3) Cohesion

In developing the idea of energy it is important to distinguish between an agent which merely transforms energy (kinetic energy) and an agent which actually has within itself the ability to do a certain amount of work (potential energy). (Adhesion, Cohesion, Atmospheric Pressure [Vacuum] represent potential energy.)

The atmosphere has the potential energy of nearly 15 pounds on a square inch at the 40th meridian at sea level. *Atmospheric Pressure*

This energy acts at all times on every molecule or body, fluctuating only with the altitude where the body is placed, and may be turned into mechanical power when an airless space or vacuum is effected.

Then this atmospheric column will place an amount of pressure against the body in proportion to the density and quantity of the air-thin space. This shows us that the so-called "potential energy of vacuum" really is the potential energy of the atmosphere under certain conditions.

We should employ this enormous atmospheric energy as a balancing power against the dental *load*.

Besides the atmospheric pressure we have two more forces working under an artificial denture: adhesion and cohesion. *Adhesion and Cohesion*

The forces which bind *like* kinds of molecules together are commonly called cohesive forces; those which bind together molecules of *unlike* kind are called adhesive forces. Thus we say that mucilage sticks to wood or saliva to the plate because of adhesion; while cohesion holds together the molecules of wood or the molecules of the saliva.

The adhesive and cohesive power of the saliva indeed is so small that it only could be used as a balancing power against the weight of the plate (15 dwt.).

Still the adhesive and cohesive energy of the saliva is the primary force which enables us to create a vacuum under a plate. Its molecular force is *big* enough to make an "air-tight fit" and yet *small* enough to act as a "safety device" if too strong a vacuum should be created under the plate.

Only this molecular theory of fluids is responsible for the fact that there is a limit to the amount of vacuum you can create under an artificial denture, otherwise there would be dental plates in existence which no one would be able to remove from a patient's mouth without fracturing his skull.

The fluid (the saliva) which is of so great an importance to us, we receive from the salivary glands.

It is generally understood that this term only includes the parotid, submaxillary and sublingual glands, but there are numerous other small glands of similar nature in the palate, tongue, lips and cheeks.

In the posterior half of the hard palate we find the racemose palatine glands inclosed in the dense fibrous tissues which discharge a visible or semi-fluid secretion of a distinct mucus character for the purpose of doing some chemical or mechanical labor.

We see now that when a full upper or partial upper denture is worn, the racemose gland will continuously discharge some fluid which will lodge between the tissues and the denture and thus will weaken the retaining force under the denture if this fluid is not artificially removed.

This is one of the causes of "misfit plates" which has been overlooked where patients have an excessive discharge of saliva.

For this if for no other reason the Berthold Valve (*"the heart of an artificial denture"*) is a vital factor in removing all surplus saliva from under the plate.

The cohesive power of the mucus discharged from the follicles of the palate is considerably stronger than that of the watery secretion of the 3 main types of salivary glands. Even chemically they are different, the mucus reacts acid, the saliva is generally neutral.

The facility with which the saliva changes its shape might lead us to suspect that the molecules of this fluid exert almost no force upon one another but a simple experiment will show that this is far from true.

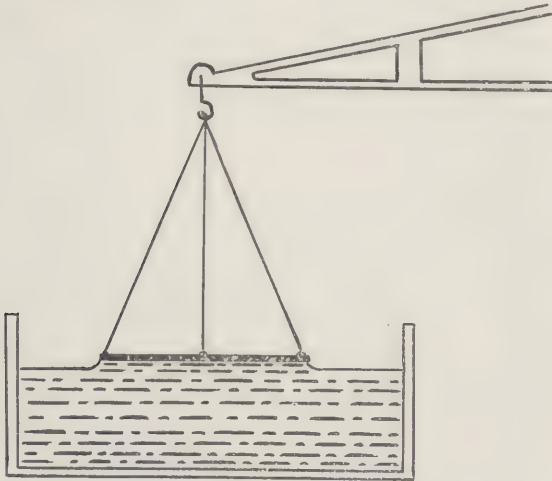


Fig. No. 1

By means of sealing wax and string let a glass plate be suspended horizontal-

ly from one arm of a balance (Fig. No.1). After equilibrium is obtained let a surface of water or saliva be placed just beneath the glass plate and the beam pushed down until contact is made.

It will be found necessary to add a considerable weight to the opposite beam in order to pull the plate away from the water or saliva.

Since a layer of water will be found to cling to the glass, it is evident that the added force applied to the beam has been expended in pulling water molecules away from water molecules, not in pulling glass away from water and this is the proof that *cohesion* is the third power in holding up plates.

If we make a graphic representation of the main forces acting against an artificial denture, the retaining force versus the "chewing force" and only consider a 60 pound pressure brought against the lingual side of the upper incisors then we notice the following.

*The
Creation
of a
Balancing
Power*

The incisal force Q (60 pounds) presses in a diagonal direction against point A (Fig. 2), trying to tip the plate, that means making the alveolar process under the upper incisors the fulcrum (F).

Therefore suppose that the distance between A-F is 1 cm. and the distance between F-D is 5 cm. then the retaining or balancing force on the posterior end of the plate must be:

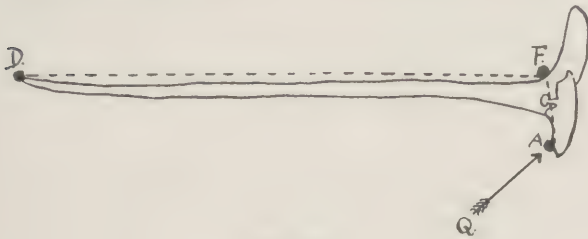


Fig. No. 2

$$60 \times A-F = P \times F-D$$

$$P \text{ then is } = 12 \text{ pounds}$$

Knowing that at least 60 pounds of pressure is required to masticate the average food and realizing that a patient wears a dental plate primarily for this purpose, therefore we must apply all possible means to at least create a 12 pound retaining force on the posterior part of the palate.

The same formula demonstrates the leverage and forces required on both occlusal sides.

To a certain extent this leverage can be balanced by placing an oblong air-chamber along the posterior ridge of the plate (see Fig. 2, page 32).

By means of a valve the air from this chamber will be extracted and a specially strong retaining force under this part will be established. After a certain length of time the tissues will be drawn into this groove and thus postdam the plate. The retaining force (vacuum) will be held by such postdaming even during movement of soft palate muscles.

In order to hold within the entire palatal surface of the denture the force (vacuum) created through the Valve, it is advisable to grind a channel or shallow groove about 2 Millimeters wide and 1 Millimeter deep entirely around the periphery of the denture. The tissues will be drawn into such channel.

The constant advance made in Dental Science has changed very materially old methods used in constructing artificial dentures. Chief among these we might mention the present day practice of complicated impression taking, postdaming and contracting of mouth tissue before impression taking.

The Dental Profession has created a *Public* public demand for perfect fitting dentures *Opinion* which must be satisfied.

The average patient who wears a "non-functioning denture" is often attracted to

the man who advertises his ability to make a plate with which the wearer may "eat corn off the cob, etc."

By graphically illustrating the arrangement of the channels referred to on page 13 and comparing them with postdaming we can readily see that the mechanical arrangement of the channel system gives us much better results in balancing any masticating force.

In a short time the tissues will partly fill the channels and we will then have the reverse principal of postdaming.

Witness the quantities of plates made by advertising dental offices (one in Chicago with a weekly average of 100 plates, another 60, another 150).

Witness the enormous National sale of adhesive powders (Corega-Wernets Powder) used as an aid in retaining dentures.

Does not this indicate that the majority of plate wearers are, after a certain length of time, not as well satisfied with their dentures as the dentist may have hoped or claimed? *Conclusion*

And it is quite natural that our present methods of constructing plates are far from being perfect when we admit our crude way of scraping the plaster from

the palatal side of a plate after vulvanization or using tinfoil or grinding off imperfections, etc., from that part of a plate which is supposed to be in perfect adaptation with the tissues.

Compare our rough work with the precise delicate way of a fine mechanic who will use the most elaborate methods of grinding two surfaces under which he has to hold a vacuum force. And besides the initial requirement of having two perfect planes this same mechanic and every engineer must use a valve in order to create this vacuum.

Now realizing all this it seems quite fitting that a Dentist should use the same methods and appliances that have for centuries proved absolutely successful and essential in other professions.

CHAPTER IV.

THE BERTHOLD VALVE

The atmosphere has a potential energy of approximately 15 pounds on a square inch (at sea level) at the 40th meridian.

This pressure may be turned into mechanical power when an airless space is effected.

As every denture is held in place by atmospheric pressure, adhesion and cohesion and because atmospheric pressure is the greatest of these three forces, therefore we should employ this enormous atmospheric energy as the chief retaining power for artificial dentures.

In physics we recognize the laws governing the action of valves and their aid in creating and maintaining vacuum.

Our research department has carried on extensive experiments for a period of over four years with the object in view of enabling the dentist to use this natural constant force by means of a valve as an aid in retaining dentures.

It is the office of The Berthold Valve to direct the action of the atmospheric pressure and saliva to the best advantage and without injury to the tissues.

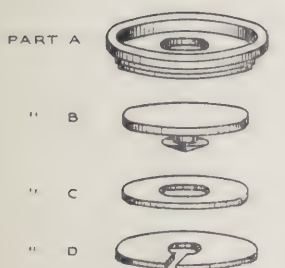
The object of our research work has been to make artificial dentures more

effective and economical by keeping them in a proper, comfortable and useful position in the mouth by means of a valve.

The patient wearing a denture equipped with a Berthold Valve can create at will, by a slight suction movement of the tongue a retaining force between the entire surface of the plate and the tissues of the mouth.

Therefore after several years of testing and proving out in practical cases with perfect results and great satisfaction to dentist and patient, we recommend The Berthold Valve for retaining dentures firmly and comfortably in proper position.

DESCRIPTION AND TECHNIC



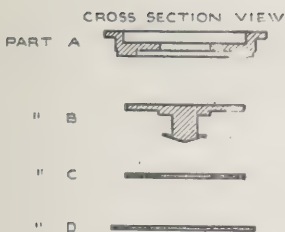
The Berthold Valve consists of four parts as follows:

Part A Valve Body or Cup.

Part B Valve Cap and Stem.

Part C Valve Packing to lie between parts A and B.

Part D A slotted Spring Disk that slips under the end of the stem ("collar button" end) of Part B.



The Berthold Valve is opened by suction but closes mechanically.

We wish to acknowledge the great aid given to us by Mr. John V. Amenta in working out a practical and simple technic for applying the Valve to full and partial dentures.



FIGURE NO. 1

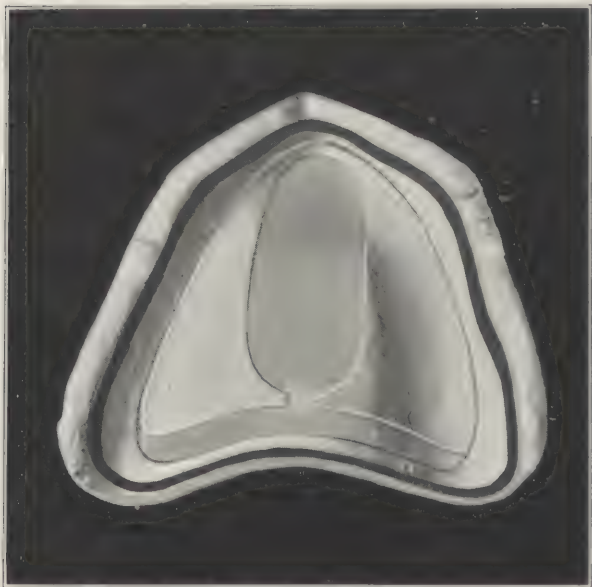


FIGURE NO. 2

RUBBER PLATES

The following technic for inserting the Improved Berthold Valve into plates has been found to be most successful.

- (1) Outline *on the impression* with an indelible pencil height and length of plate (periphery outline). Fig No. 1.
- (2) Flow with a hot spatula a thin narrow film of Inlay Wax all around the impression on the periphery outline. (This eliminates the inaccurate scraping of the model.) See heavy black line on impression in Fig. No. 2.
- (3) Relieve (by scraping the impression) the hard area and an oblong channel along the posterior margin of the plate. With a pointed instrument scratch a line around the entire ridge terminating at the ends of the oblong relief as shown in Fig. No. 2.

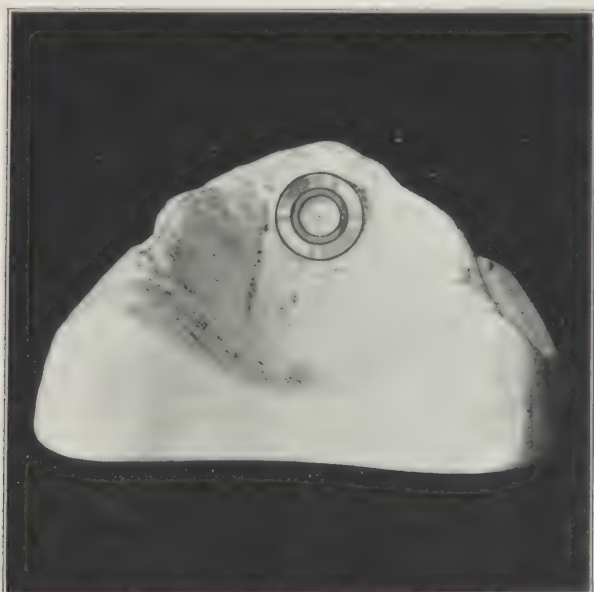


FIGURE NO. 3



FIGURE NO. 4

- (4) Wax the Vulcanizing Ring on the anterior third of the model with the step cavity surface of the Vulcanizing Ring facing you. See Fig. No. 3.

- (5) Drive three pins into the model inside of the Vulcanizing Ring to hold same firmly in position. See Fig. No. 4.



FIGURE NO. 5

- (6) Cut off three pins flush with the surface of the Vulcanizing Ring and fill the inside of Ring with soft plaster. See Fig. No. 5.
- (7) Wax up, flask, pack and vulcanize in the usual way. Care must be taken not to cover Ring with tin foil collodium or silex before packing.
- (8) In finishing and polishing care must be taken not to wear away the lingual surface of the Vulcanizing Ring. DO NOT FINISH DOWN THE RING. Note that the Valve must fit into the step cavity of the Vulcanizing Ring and that the tongue surface of the Valve must be flush with the same surface of the Vulcanizing Ring.



FIGURE NO. 6

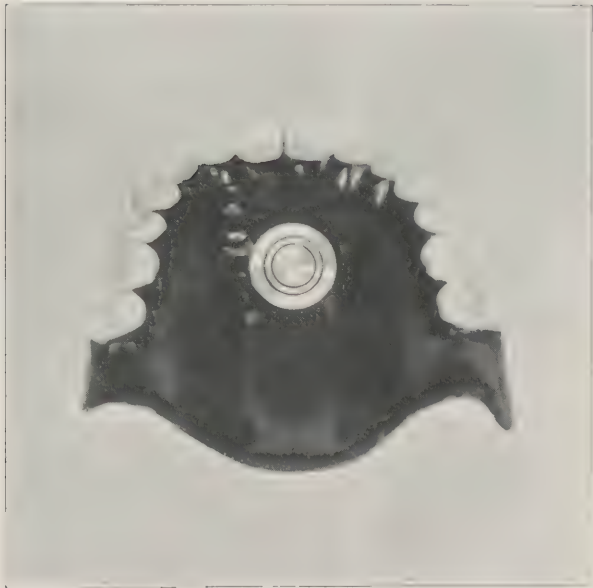


FIGURE NO. 7

(9) After the plate has been finished and polished dry and clean the step cavity and undercut of the Vulcanizing Ring and cement the Valve into the Ring with good Crown and Bridge Cement. The same care should be used in cementing the Valve as is taken with cementing Interchangeable Teeth on a bridge. See Figs. No. 6 and 7.

The Berthold Valve in position must be flush with the bottom of relieved area on the palatial surface of a plate.

After cementing the Valve into the Vulcanizing Ring and when the cement is thoroughly hardened carefully scrape away any surplus cement that may have adhered to either surface of the Valve.

If a model, instead of an impression, is to be prepared, cut very thin air chamber metal (30 gauge) of the same outline as shown for relief in Fig. No. 2, otherwise the method is the same as when an impression is prepared.

GOLD PLATES

Disassemble the Valve by removing circular disk spring from the bottom thereof and take out stem and packing together.

Prepare impression or model in same way as heretofore described.

Cut a round hole of exact diameter of Valve cup in the anterior third of plate and solder the Valve cup therein.

Be sure the bottom of Valve cup is flush with the inside or palatal surface of the plate so that the Valve will not touch the tissue of the roof of the mouth.

In finishing and polishing metal plates great care must be taken not to cut or finish down the valve cup body otherwise the Valve stem will not seat flush with the outside edge of the Valve cup.

ALUMINUM PLATES

Cut hole as described for gold plates but slightly larger in diameter than Valve cup. Cut rubber retentions in plate around hole and vulcanize Valve cup into position. Note that the outside edge of Valve cup has a groove into which vulcanite will set.

OLD PLATES

Take plaster impression using old plate as an impression tray the same as for a reline case.

Prepare this new impression as described on pages 2, 4 and 6.

SEPECIAL DIRECTIONS FOR APPLYING THE BERTHOLD VALVE WITHOUT RE- VULCANIZING

It sometimes happens that an upper denture, perfect as to fit and with a complete peripheral seal, will not stay up and for the following reason.

When the denture is put into position in the mouth an air *cushion* instead of a *vacuum* is formed thereby dislodging the plate.

For cases of this kind The Berthold Valve can be put into the plate in the following manner without re-vulcanizing.

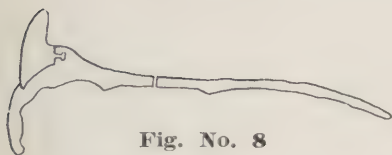


Fig. No. 8

Drill a whole entirely through the plate with a No. 7 Round Bur and in approximately the position (anterior third) as shown in cut, Fig. No. 8.

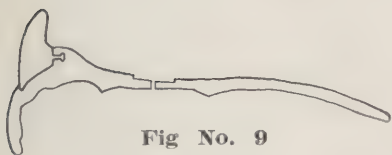


Fig No. 9

With a No. 9 size Root Facer, (larger size of the two furnished by us), drill a step cavity in plate as shown in cut, Fig. No. 9. The *depth* of this first cutting should be the same as the thickness of the largest outside dimension of the valve.

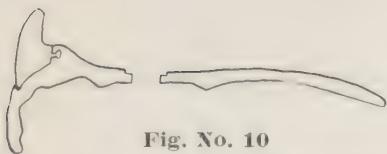


Fig. No. 10

With the small size (No. 8) Root Facer next drill entirely through the plate and you will have a step cavity like shown in cut, Fig. No. 10 into which the valve will fit snugly.

Cement the valve into the step cavity using a good quality of crown and bridge or inlay cement. See that the edge of the valve is flush with the lingual surface of the plate.

11-11-11



WU 500 B286e 1922

51120770R



NLM 05266616 8

NATIONAL LIBRARY OF MEDICINE